[002] This application is a national stage of PCT/GB2003/005078 filed November 21, 2003 which claims priority from British Application Serial No. 0322096.9 filed September 20, 2003, which claims priority from British Application Serial No. 0320995.4 filed September 9, 2003, which claims priority from British Application Serial No. 0227193.0 filed November 21, 2002, which claims priority from British Application Serial No. 0227191.4 filed November 21, 2002.

[003] FIELD OF THE INVENTION

[022] BACKGROUND OF THE INVENTION

[043] SUMMARY OF THE INVENTION

[049] BRIEF DESCRIPTION OF THE DRAWINGS

[079] DETAILED DESCRIPTION OF THE INVENTION

24. (NEW) A suspension system for a vehicle with a chain driven rear wheel comprises:

i) a rear suspension assembly and chain driven transmission arrangement that offers very high levels of anti-brake lift and anti-squat and does so consistently through a large range of rear suspension movement;

ii) a front suspension assembly/steering system with a steering axis inclined in the side view at an angle of castor which intersects the ground in front of the centre of the contact patch, the front suspension assembly having a high degree of anti-brake dive; wherein:

iii) the front and rear suspension assemblies are interconnected in such a way as to offer low resistance to anti-phase motion and higher resistance to in-phase motion.

25. (NEW) The suspension system according to claim 24, wherein the rear suspension assembly comprises a trailing arm (12, 42, 60, 62, 68), a rear wheel (10) being mounted to the trailing arm (12, 42, 60, 62, 68) at the rearward end thereof by a hub (34), the trailing arm (12, 42, 60, 62, 68) being attached to a frame (14) of the vehicle by a pivot (16, 46, 66, 72), such that the tension side of a chain (18) of the chain transmission, intersects a line interconnecting the center of the wheel (10) and the axis of the pivot (16, 46, 66, 72), at a point (24) intermediate of the center of the wheel (10) and axis of the pivot (16, 46, 66, 72).

26. (NEW) The suspension system according to claim 25, wherein the chain tensioning means (22) is provided to accommodate coupling between the rear suspension assembly and chain transmission.

27. (NEW) The suspension system according to claim 25, wherein the rear wheel (10) has a hub mounted brake (40), a brake reaction lever (32) being attached to the hub (34), so that the hub (34) may rotate relative to the brake reaction lever (32) as long as the brake (40) is not applied, a brake reaction link (30) connecting the brake reaction lever (32) to a point (36) on the vehicle frame (14), at a level above the axis of the pivot (16) between the trailing arm (12) and frame (14).

28. (NEW) The suspension system according to claim 25, wherein the rear suspension and chain transmission are substantially de-coupled throughout the full range of suspension travel.

29. (NEW) The suspension system according to claim 28, wherein a drive sprocket wheel (20) mounted on the frame is connected to a driven sprocket wheel (50) on the wheel (10), via an idler sprocket wheel (44, 44', 44"), the idler sprocket wheel (44, 44', 44") being positioned such that the length of chain (18) under tension between the drive sprocket wheel (20) and idler sprocket wheel (44, 44', 44") and, between the idler sprocket wheel (44, 44', 44") and driven sprocket wheel (50) will remain substantially constant, throughout the full range of suspension travel.

30. (NEW) The suspension system according to claim 29, wherein the idler sprocket wheel (44) is mounted on the trailing arm (42), the point at which the length of chain (18) between the drive sprocket wheel (20) and the idler sprocket wheel (44) first contacts the idler sprocket wheel (44), coincides with the axis of the pivot (46) between the trailing arm (42) and frame (14).

31. (NEW) The suspension system according to claim 29, wherein the idler sprocket wheel (44') is mounted on the frame (14), the length of chain (18) between the idler sprocket wheel (44') and the driven sprocket wheel (50) passing through the axis of the pivot (46) between the trailing arm (42) and frame (14) through the full movement of the trailing arm (42).

32. (NEW) The suspension system according to claim 29, wherein the wheel hub (34) is mounted on a hub carrier (60), the hub carrier (60) being mounted to the frame (14) by a pair of trailing arms (62,68), the trailing arms (62,68) converging towards the frame (14), the axis of the length of chain (18) between the idler sprocket wheel (44) and the driven sprocket wheel (50) passing through the point of intersection (V) of the axes of the trailing arms (62,68).

33. (NEW) The suspension system according to claim 30, wherein the chain tensioning means (48) is provided in the length of chain (18) from the driven sprocket wheel (50) to the drive sprocket wheel (20).

34. (NEW) The suspension system according to claim 30, wherein the first and second idler sprocket wheels (44") are drivingly interconnected, one idler sprocket wheel (44") being drivingly connected to the drive sprocket wheel (20) by a first chain (18') and the other idler sprocket wheel (44") being drivingly connected to the driven sprocket wheel (50) by a second chain (18").

35. (NEW) The suspension system according to claim 29, wherein the chain (18, 18") between the idler sprocket wheel (44, 44', 44") and the driven sprocket wheel (50) has an angle to the horizontal, in side elevation of from 25 to 50 degrees.

36. (NEW) The suspension system according to claim 24, wherein the front suspension assembly comprises a fork assembly (70), the fork assembly (70) being connected at its upper end to a steering assembly (72,98) by means of an upper wishbone (74) and, intermediate of its ends, to a frame (14) by a lower wishbone (76), in a manner which will allow the transmission of steering movements to the fork assembly (70); a front wheel (84) being rotatably connected to the lower end of the fork assembly (70) by means of a hub (34), the front wheel (84) having a hub mounted brake (40), a brake reaction lever (90) being attached to the hub (34), so that the hub (34) may rotate relative to the brake reaction lever (90) as long as the brake (40) is not applied, a brake reaction link (92) connecting the brake reaction lever (90) to the upper wishbone (74), the connection (82) of the fork assembly (70) to the upper wishbone (74) being intermediate of the connections (80,96) of the upper wishbone (74) to the steering mechanism (72,98) and of the brake reaction link (92) to the upper wishbone (74).

37. (NEW) The suspension system according to claim 24, wherein the front and rear suspension assemblies are interconnected by means of a balance beam (104, 144), the balance beam (104, 144) being connected at a forward end to the front suspension assembly and at a trailing end to the rear suspension assembly, such that for in-phase motion the front and rear suspension assemblies will apply a load to the balance beam (104, 144) in the same direction and for anti-phase motion the balance beam (104, 144) will pivot about a point intermediate of the forward and trailing ends so that a load applied to the balance beam (104, 144) by one of the front and rear suspension assemblies will be transmitted to the other of the front and rear suspension assemblies, in the opposite direction.

38. (NEW) The suspension system according to claim 37, wherein a pair of spring/damper units (112,114) act between the frame (14) and the balance beam (104, 144), the spring/damper units (112,114) being connected to the balance beam (104, 144) at axially spaced locations (118), whereby for in-phase motion both spring/damper units (112, 114) will be in compression, while for anti-phase motion, one spring/damper unit (112, 114) will be in compression while the other spring/damper unit (114, 112)

extends, the balance beam (104, 144) pivoting about the connection (118) thereof with the spring/damper unit (112, 114) under compression.

39. (NEW) The suspension system according to claim 24, wherein the front and rear suspension assemblies are interconnected by a balance lever (154), the front and rear suspension systems being connected to the balance lever (154) by first and second spring/damper units (150,160) and a third spring/damper unit (164) acting between the balance lever (154) and vehicle frame (14), the third spring/damper unit (164) biasing the balance lever (154) to a neutral balance position, the front and rear suspension assemblies being connected to the balance lever (154) such that; for in-phase motion first and second spring/damper units (150, 160) will be compressed, the balance lever (154) being retained in its neutral balance position by the third spring/damper unit (164); and for anti-phase motion the first and second spring/damper units (150, 160) act as a substantially rigid link, the balance lever (154) pivoting against the third spring/damper unit (164), so that a load applied to the balance lever (154) by one of the front and rear suspension assemblies will be transmitted to the other of the front and rear suspension assemblies, in the opposite direction.

40. (NEW) The suspension system according to claim 24, wherein the plungers (172, 182, 186, 192) attached to the front and rear suspension assemblies are interconnected by a cage (174), first and second spring means (180, 190) acting between heads (182, 192) of the plungers (172, 182, 186, 192) and adjacent inner ends of the cage (174), and further spring means (176, 188) acting between the cage (174) and the vehicle frame (14), to bias the cage (174) to a neutral balance position, whereby; for in-phase motion the first and second spring means (180, 190) will be compressed, the cage (174) being retained in its neutral balance position by the further spring means (176, 188); and for anti-phase motion the load applied to one of the first and second spring means (180,190) by movement of the suspension assembly, causing the cage (174) to move from its balance position against the restoring force applied by the further spring means (176, 188), so that a load applied to the cage (174) by one of the front and rear suspension assemblies will be transmitted to the other of the front and rear suspension assemblies, in the opposite direction.

41. (NEW) The suspension system according to claim 24, wherein the means (206, 236) is provided for adjustment of the interconnection, to selectively alter the pitch attitude of the vehicle.

42. (NEW) The suspension system according to claim 24, wherein the means (230, 240, 246) is provided for adjustment of the interconnection to selectively alter the suspension height.

43. (NEW) A front suspension assembly for a vehicle comprising a fork assembly characterised in that the fork assembly (70) is connected at its upper end to a steering assembly (72, 98) by an upper wishbone (74) and, intermediate of its ends, to a vehicle frame (14) by a lower wishbone (76), in a manner which will allow the transmission of steering movements to the fork assembly (70); a front wheel (84) being rotatably connected to the lower end of the fork assembly (70) by a hub (34), the front wheel having a hub mounted brake (40), a brake reaction lever (90) being attached to the hub (34), so that the hub (34) may rotate relative to the brake reaction lever (90) as long as the brake (40) is not applied, a brake reaction link (92) connecting the brake reaction lever (90) to the upper wishbone (74), the connection (82) of the fork assembly (70) to the upper wishbone (74) being intermediate of the connections (80,96) of the upper wishbone (74) to the steering mechanism (72, 98) and of the brake reaction link (92) to the upper wishbone (74).

44. (NEW) The suspension assembly according to claim 36, wherein the fork assembly (70) is connected to the upper wishbone (74) by a pivot (82) which allows pivotal motion about an axis parallel to the axis of rotation of the wheel (84), while permitting some angular compliance in a plane at right angles to the axis of the fork assembly (70).

45. (NEW) The suspension assembly according to claim 36, wherein the fork assembly (70) is connected to the upper wishbone (74) by a universal joint (82), the axis of the universal joint (82) being coaxial with the axis of the fork assembly (70).

46. (NEW) The suspension assembly according to claim 44, wherein the fork assembly (70) is connected to the lower wishbone (76) by a spherical joint (88).